

### Tibial Fracture:

\*The most common fracture of long bones in the body as  $\frac{1}{3}$  of its surface is subcutaneous

### Classification

#### 1) Anatomical (according to Site of trauma)

-Upper  $\frac{1}{3}$  (Upper metaphyseal) -Middle  $\frac{1}{3}$  (Diaphyseal) -Lower  $\frac{1}{3}$  (Lower metaphyseal)

#### 2) According to the configuration:

-Simple (Transverse – Short Oblique – Long Oblique – Spiral)

-Comminuted: -Stable: comminution < 50 % of the cortex (stable at both axial & torsional)

-Unstable: comminution = 50 % (stable at axial but unstable at torsional)

-Highly Unstable: comminution > 50 % + Segmental fracture (at diaphysis, not articular)

**\*\*Bifocal fraction:** Fracture of: -Proximal + distal or -Shaft + tibial plateau or -Shaft + ankle

#### 3) According to the soft tissue damage:

**\*Importance:** Open fractures → ↑ (1-Degree of delayed or non-union 2-Lability of infection 3-Stiffness)

### A) Oestern Classification:

Grade 0	Minimal soft-tissue damage.
Grade 1	Superficial abrasion or contusion
Grade 2	Deep contaminated abrasion associated with localised skin or muscle contusion
Grade 3	Extensive skin contusion (Degloving) +Associated major vascular and/or nerve injury.

### B) Gustilo Classification:

Grade I	Wound < 1 cm
Grade II	Wound 1 - 10 cm
Grade III	Wound > 10 cm
	III-a Adequate periosteal coverage
	III-b Periosteal stripping and bone damage
	III-c Arterial injury

### Mechanism of the Injury:

-Transverse: Direct trauma -Short - Long Oblique: Twisting -Spiral: Twisting + Overload

### Clinical Diagnosis:

1-History of trauma 2-Edema, bruises, severe pain at movement

### Radiological Diagnosis (3 X-Rays)

-AP → Med. & Lat. Displacement -Lateral → Ant. & Post. displacement -Oblique → Spiral displacement

### Treatment:

#### A) Conservative: (cast)

Indications: 1-Children 2-Undisplaced 3-Inoperable

#### B) Surgery:

Indications: 1-Intra-articular (Tibial Plateau & Plafond) 2-Displaced fracture 3-Segmental fracture  
4-Concomittant (e.g. ipsilateral tibia + humerus) 5-Multi-trauma 6-Failed conservative

### Complications:

A) Early: vascular & neural injuries, Infection, compartment syndrome (esp. upper  $\frac{1}{3}$ )

B) Late: non-union, delayed union, mal-union, stiffness

## Ankle Sprain:

**\*Strain:** damage of muscle bundles    **\*Sprain:** damage of the ligament

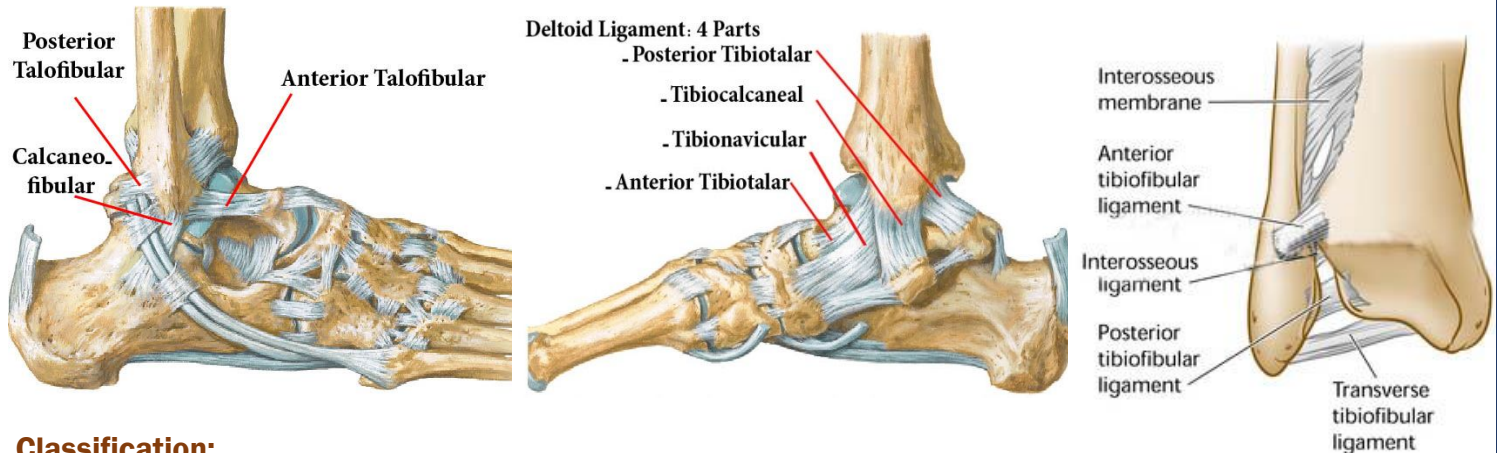
### Anatomy of Ankle ligaments:

**A) Laterally:** Anterior talofibular – Posterior talofibular – Calcaneofibular

**B) Medially:** Deltoid 1-Superficial: 4 parts (Tibionavicular - Ant tibiotalar - Post tibiotalar - Tibiocalcaneal)  
2-Deep (from under surface of m. malleolus to the medial aspect of the talus)

**C) Syndesmosis:** (Between distal end of tibia & distal end of fibula)

(Ant. inf. tibiofibular - Post. inf. tibiofibular - Inf. transverse tibiofibular - Interosseus) Ligaments



### Classification:

**Clinically:** 1-Mild: Just stretch of the ligament    2-Moderate: incomplete rupture of the ligament  
3-Severe: complete rupture of the ligament

### Mechanism of injury:

**1-Lateral Ligament:** Inversion with plantar flexion

**\*The most common ligament sprain in the body is Ant. Talofibular ligament sprain as it's the only stabilizer in plantar flexion**

**2-Deltoid ligament:** Eversion with abduction

### Clinical Diagnosis:

**1-History of trauma**    **2-Edema, bruises**    **3-Tenderness point:** (Lat. Ligament: at medial malleolus)

**4-Tests:**

**a-Anterior Drawer test:** Pull heel anteriorly, Positive test finding is Laxity and poor endpoint (Lat. Lig.)

**b-Compression Test:** (for syndesmotomic ligaments) Positive → severe pain

### Radiological Diagnosis:

**1-AP (at 20° internal rotation → the joint space is seen evenly (2 mm) on both sides of the ankle)**  
Talar tilting or > 2 mm joint space → Lat. Ligament sprain

**2-Stress view:** X-ray made when the ankle is stressed into supination and external rotation

### Treatment:

**1-Mild:** Icepacks - compression bandage - No loading on limb for 72 h (put a pillow under the whole limb)  
± (Antibiotic – Anti-inflammatory – Antifibrinolytic)

**2-Moderate:** Cast for 6 weeks (but edema must be subsided first)

**3-Severe:** at 1<sup>st</sup> 6 hours without edema: Open surgery & ligament repair

After 6 hours or there is edema: Cast for 6 w (edema must be subsided)

## Pott's Fracture

### Classification:

**A) Lauge-Hansen:** المصطلح based on the position of the foot and the deforming force at the time of injury.

<b>1) Supination-Adduction</b>	
Stage I	Traction fracture of lat. malleolus at or below level of ankle joint or rupture of talofibular lig.
Stage II	Near vertical fracture of medial malleolus.
<b>2) Supination-Lateral Rotation</b>	
Stage I	Rupture of anterior tibiofibular ligament.
Stage II	Oblique fracture or spiral fracture of the lateral malleolus.
Stage III	Rupture of posterior tibiofibular ligament or fracture of medial malleolus.
Stage IV	Transverse fracture of Tibial malleolus.
<b>3) Pronation-Abduction</b>	
Stage I	Transverse fracture of medial malleolus or rupture of deltoid ligament.
Stage II	Rupture of both anterior and posterior tibiofibular ligaments with fracture of posterior tibia.
Stage III	Bending fracture of the fibula, generally just above the ankle joint
<b>4) Pronation-Lateral Rotation</b>	
Stage I	Rupture of deltoid ligament or avulsion of medial malleolus.
Stage II	Rupture of anterior tibiofibular ligament and interosseous ligament.
Stage III	Short spiral fracture of the fibula (typically 6 cm above ankle joint).
Stage IV	Fracture of posterior tibial margin or rupture of posterior tibiofibular ligament.
<b>5) Pronation-Dorsiflexion</b>	
Stage I	Fracture of the medial malleolus.
Stage II	Fracture of the anterior lip of the tibial.
Stage III	Fracture of the supramalleolar aspect of the fibula
Stage IV	Rupture of the posterior inferior tibiofibular ligament or fracture of the posterior malleolus.

**B) AO Classification:** according to the relationship of the fibular fracture to the syndesmosis (radiological)

Type A	fibular fracture below the syndesmosis
Type B	fibular fracture at the level of the syndesmosis
Type C	fibular fracture above the syndesmosis

### C) Anatomical:

- 1- Unimalleolar fracture
- 2- Bimalleolar fracture
- 3- Trimalleolar fracture (Med + Lat + distal posterior aspect of the tibia)

**Clinical Diagnosis:** 1-History of trauma 2-Edema, bruises

**Radiological Diagnosis:** 1-(AP + Lateral) X-ray 2-CT: in cases of intra-articular fractures

**Treatment:** Mainly (Surgery) as any talar tilt leads to prolonged ankle pain & early arthritis

**A) Conservative:** only when there is a simple fracture at lat. malleolus undisplaced with no lig. Injury

### B) Surgical:

**1-Malleolar Screw:** resembles cancellous screw but with tapered end (in med. malleolus oblique fracture)

**2-Plates & Screw:** used in Lat. malleolus fractures

**3-Tension Wire Band:** used in Transverse fracture of medial malleolus

**\*\*Lat. malleolus oblique fracture + syndesmotc ligament disruption → Syndesmotc screw**

**4-External Fixator:** Indications: 1-Open fracture 2-Infection 3-Burned 4-Highly comminuted 5-Vascular Injury 6-Nerve Injury

**Complications:** + (Ankle stiffness – Persist pain after healing)

**\*\*Causes of Ankle pain after Trauma:**

- 1-Talar bone fracture
- 2-Tendinitis of Tibialis posterior
- 3-Subluxation of peroneal tendon
- 4-Fibrotic synovitis in the lateral aspect of the Ankle

